

## WHAT IS CLAIMED IS:

1. An ultrasonic diagnostic imaging system which acquires images of differently oriented image planes of a patient in rapid succession comprising:
  - 5 a probe including a two dimensional array transducer;
  - a beamformer, coupled to the array transducer, for scanning beams over a variety of different
  - 10 directions and inclinations with respect to the array transducer;
  - a beamformer controller programmable to scan beams over differently oriented image planes in a sequence of image planes until acquisition of the
  - 15 image planes has been completed;
  - an image processor coupled to the beamformer;
  - a display coupled to the image processor;
  - a plane orientation control, coupled to the beamformer controller, for adjustment of the
  - 20 orientation of an image plane; and
  - an acquisition control, coupled to the beamformer, for initiation of the acquisition of the sequence of image planes.
- 25 2. The ultrasonic diagnostic imaging system of Claim 1, further comprising a source of patient heart waveforms coupled to the beamformer controller.
- 30 3. The ultrasonic diagnostic imaging system of Claim 1, wherein the image processor further comprises a contrast agent image processor.
4. The ultrasonic diagnostic imaging system of Claim 1, wherein the plane orientation control

further comprises a manually operated user control;  
and further comprising:

a storage device for storing scanning parameters  
for a plane orientation selected by the user control.

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5. The ultrasonic diagnostic imaging system of  
Claim 4, further comprising a plurality of imaging  
parameters which may be adjusted by a user; and

a storage device for storing adjusted imaging  
parameters.

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6. The ultrasonic diagnostic imaging system of  
Claim 5, wherein the beamformer controller is  
responsive to stored scanning parameters and imaging  
parameters upon activation of the acquisition  
control.

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7. A method for performing the acquisition of  
ultrasonic images of a plurality of differently  
oriented image planes in rapid succession comprising:

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aiming a first image plane of a two dimensional  
array probe through an acoustic window of a body;

reaiming the image plane through the acoustic  
window to image a second image plane of a different  
orientation than the first image plane;

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storing information defining the orientation of  
the second image plane; and

initiating a sequence of image acquisition which  
acquires an image of the first image plane followed  
by an image of the second image plane by use of the  
stored information.

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8. The method of Claim 7, wherein reaiming  
further comprises reaiming the image plane through  
the same acoustic window as that of the first image

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plane.

9. The method of Claim 8, further comprising  
storing information defining the orientation of the  
5 first image plane,

wherein initiating further comprises using the  
stored information of the first image plane.

10. The method of Claim 7, further comprising  
10 infusing the body with an ultrasonic contrast agent.

11. The method of Claim 10, further comprising,  
following infusing, applying stress to the body and,  
following applying, repeating the initiating step.

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12. The method of Claim 10, wherein the body  
comprises the heart and wherein the myocardium of the  
heart is infused with the contrast agent.

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13. The method of Claim 12, wherein, in the  
aiming and reaiming steps, the first image plane  
comprises one of an AP4, AP2, or AP3 view of the  
heart, and the second image plane comprises a  
different one of an AP4, AP2, or AP3 view of the  
25 heart.

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14. The method of Claim 7, further comprising  
adjusting an image parameter after at least one of  
the aiming and reaiming steps; and

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storing the adjusted image parameter for each  
step,

wherein initiating further comprises using the  
stored adjusted image parameter during image  
acquisition.

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15. A method for acquiring diagnostic ultrasound images of the heart comprising:

maintaining a two-dimensional array probe in contact with an acoustic window of a body to image a first plane of the heart;

imaging a second plane of the heart by selective change of the beam steering while maintaining the probe in contact with the acoustic window;

storing information describing the orientation of the first and second planes;

introducing a contrast agent into the myocardium of the heart;

acquiring a heart cycle waveform of the heart; and

acquiring images of the first and second planes of the heart by use of the stored information and in synchronism with the heart cycle waveform.

16. The method of Claim 15, wherein acquiring further comprises acquiring images of the first and second planes during a single waveform.

17. The method of Claim 16, wherein acquiring further comprises acquiring another set of images of the first and second planes a predetermined number of heart cycles following the first acquiring of images.

18. The method of Claim 15, wherein acquiring further comprises acquiring an image from a different plane in successive heart cycles.

19. The method of Claim 15 further comprising: following the first acquiring of images of the first and second planes of the heart, increasing the heart rate; and

following increasing the heart rate, acquiring  
for a second time images of the first and second  
planes of the heart by use of the stored information  
and in synchronism with the heart cycle waveform.

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20. The method of Claim 16, wherein acquiring  
images of the first and second planes of the heart  
further comprises acquiring less than all of the  
scanlines of the first and second planes alternately  
until complete images of the first and second planes  
have been acquired.

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